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NOTES ON SAPINDACEAE IN AUSTRALIA, II

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The genera *Alectryon* (nine species), *Cossinia* (one species), *Dimocarpus* (two species), *Heterodendrum* (four species) and *Lepiderema* (six species) are dealt with. All taxa are described and keys to the species of each genus provided.

Alectryon kimberleyanus, *A. unilobatus*, *Cossinia australiana*, *Heterodendrum pubescens*, *H. tropicum*, *Lepiderema hirsuta*, *L. largiflorens* and *L. ixiocarpa* are described as new. *Dimocarpus leichhardtii* is a new combination based on *Euphoria leichhardtii* Benth. *Cossinia* is recorded from Australia for the first time and *C. pinnata* Commerson ex Lam. is chosen as its lectotype species.

Contents

<i>Alectryon Gaertn.</i>	472
<i>Cossinia Commerson ex Lam.</i>	485
<i>Dimocarpus Lour.</i>	494
<i>Heterodendrum Desf.</i>	481
<i>Lepiderema Radlk.</i>	488

ALECTRYON

Alectryon Gaertn., Fruct. 1:216, t.46 (1788). **Type species:** *A. excelsus* Gaertn.

Spanoghea Blume, Rumph. 3:172 (!847). **Type species:** *S. ferruginea* Blume

Trees or shrubs; indumentum of simple hairs. Leaves paripinnate; leaflets 1-5-paired, usually accrescent in size towards the tip; coriaceous, epidermis usually mucigerous. Inflorescences axillary, solitary, mostly thyrsoid, paniculate, racemiform or spiciform; bracts ovate, small. Flowers small, regular, mostly unisexual and usually monoecious; calyces acetabuliform, margins repand, dentate, or 4-6-partite, lobes ovate, subvalvate; petals 4 or 5 or absent, very small, broadly ovate, shortly clawed, with reflexed, broad, bilobed, hairy crestless scale; disc small, annular; stamens 5-8, exserted, filaments filiform, anthers as long as or longer than filaments; ovaries 2-4-locular, ovules solitary in each cell; styles terminal, filiform. Fruits mostly sessile, usually 1-4-lobed with divaricate knob-like lobes, or fruits with or without grooves or lobes; pericarp thin or thick, splitting irregularly; seeds globose, shiny, adnate at base to fleshy, granular or lobed aril.

Fifteen species, Malesia, Polynesia, New Guinea, New Zealand and Australia; nine (two new) in Australia.

1. Petals present; aril not granular, sometimes lobed at margins. Fruits if knob-lobed, finely pubescent or glabrous; leaflets entire or rarely serrulate towards apex not in accrescent pairs 2
 - Petals absent; aril granular. Fruits if knob-lobed rusty villous tomentose. Leaflets entire, serrate or denticulate; usually in accrescent pairs 4
2. Indumentum of pale rusty or brown crispate hairs. Fruits broadly ovoid or subglobose, 3- or 4-sulcate with thin inflated lobes 1. *A. connatus*
 - Indumentum if present of fine, pale, appressed straight hairs. Fruits (1-)2-4 lobed with divaricate knob-like lobes; pericarp crustaceous 3
3. Leaflets glaucous, pubescent or puberulent below, thickly coriaceous, broadly elliptic to subobovate; margins entire; rachises semiterete. Fruits finely pubescent, depressed obovoid, \pm retuse on top, 3- or 4-lobed 2. *A. coriaceus*

- Leaflets not glaucous, puberulent or glabrous below, thinly coriaceous, usually narrowly elliptic-oblong; margins entire or coarsely serrulate usually above middle; rachises usually flattened and margined. Fruits glabrous, didymous, broadly obovate or transversely ellipsoid, rarely 1- or 3-lobed 3. *A. subcinereus*
4. Leaflets entire; 1- or 2-paired, of if to 4-paired then leaflets not in accrescent opposite pairs. Fruits either turgid not lobed, or only 1-lobed, or fruits compressed and usually 2-lobed; velvety hairy to glabrous..... 5
- Leaflets serrate, denticulate to subentire; 2-4-paired in accrescent opposite pairs. Fruits turgid with 2-4 knob-like lobes or indistinctly 2-lobed, rusty villous or velvety hairy..... 7
5. Leaflets 3-4-paired, elliptic-oblong or elliptic-ovate tapering towards acute or acuminate apex, 3-5 times as long as wide. Fruit 1-lobed, obliquely ellipsoid or subglobose, often carinate towards apex, subglabrous..... 4. *A. unilobatus*.
- Leaflets 1- or 2-paired, obovate to obovate-elliptic, broad at apices, obtuse or retuse, about twice as long as wide. Fruits transversely ellipsoid, lobed or not, glabrous or hairy..... 6
6. Branchlets puberulent towards tip with fine appressed straight hairs. Leaflets coriaceous, subrigid, densely reticulate veined. Fruits compressed, usually 2-lobed, glabrous.... 5. *A. forsythii*
- Branchlets tomentose with pale \pm crispate hairs and longer straight hairs. Leaflets thinly coriaceous, not subrigid. Fruits turgid, not grooved nor lobed, velvety hairy..... 6. *A. kimberleyanus*
7. Branchlets and leaves puberulent or subglabrous. Fruits transversely ellipsoid and indistinctly 2-lobed, rarely 1-lobed, pericarp thick, very hard and subwoody. Leaflets 0.7-9.5 \times 0.4-3.2 cm, margins serrulate, denticulate or subentire 7. *A. subdentatus*
- Branchlets, leaves and fruits rusty villous pubescent. Fruits 1-3-knob-lobed; pericarp crustaceous, not as above. Leaflets 4-16 \times 2-8.5(-11.5) cm, margins serrate, serrulate or denticulate 8
8. Leaflets narrowly ovate-oblong or elliptic with acute, acuminate or obtuse tips, 4-14.5 \times 2-4.5 cm, margins serrate or serrulate; not bullate between nerves. (Panicles with slender racemiform branches; Flowers 2-4 mm diam.). Fruits without apical appendage; pericarp thick..... 8. *A. tomentosus*
- Leaflets broadly elliptic-oblong to obovate with broad, obtuse, retuse or truncate tips, 6.7-12(-16) \times 4.5-8.5(-11.5) cm, margins remotely denticulate; often bullate between nerves. (Male panicles with densely flowered spiciform branches when in bud. Flowers 2 mm diam.). Fruits with apical appendage; pericarp thin 9. *A. repando-dentatus*
- 1. *Alectryon connatus*** (F. Muell.) Radlk., Sitzungsber. Bayer. Akad. 8:299, 307 (1878); Domin, Biblioth. Bot. 89:900 (1927); Francis, Aust. Rain-For. Trees ed 3.248 (1970). Based on *Spanoghea connata* F. Muell., Trans. & Proc. Philos. Inst. Vict. 3:26 (1859). **Type:** Moreton Bay, Hill & Mueller (not seen).
- Nephelium connatum* F. Muell., l.c. 26, *pro syn.*; Benth., Fl. Aust. 1:465 (1863); F. M. Bailey, Qd Fl. 1:302 (1899). Based on *Spanoghea connata* F. Muell.
- Sapindus cinereus* Cunn. ex A. Gray in Wilkes Bot. U.S. Explor. Exped. Bot. 1:258 (1854), *pro syn.*
- Trees to 12 m; young parts and peduncles tomentose, others pubescent to subglabrous; indumentum of pale rusty crispate hairs. Leaves with (1-) 2-4 leaflets each side of rachis; petioles 2-5 cm long, semiterete; rachises (1-)5-6.5(-8) cm, semiterete, adaxially ridged; pinnae opposite or alternate, elliptic-oblong or narrowly obovate, often subfalcate, apices obtuse, retuse or subacute, margins entire or with few blunt serrulations towards apex, bases

usually oblique, acute or subacute, 4.5–14.5 × 1.5–5.8 cm, subcoriaceous, upper surfaces shiny, puberulent or glabrous, lower ones pale, ± subglaucous, papillose, pubescent to subglabrous; midribs usually pubescent; lateral nerves 6–16 pairs, subpatent; petiolules 1–3 mm long, semiterete, pulvinate. Panicles 4.5–18 cm long and as wide, laxly branched. Flowers 2–4 mm diam.; pedicels 3–7 mm long; calyces 1.5 × 2.5 mm, lobes broadly ovate, 0.5 × 1 mm, pubescent; petals broadly ovate, 1–3 × 1–3 mm, deciduous; filaments 0.5–1.5 mm, mostly glabrous, anthers 2 mm long; ovaries pubescent. Fruits shortly stipitate, subglobose or broadly ovoid, usually raised on top, apiculate (residual style), 0.8–1 × 0.8–1.2 cm, orange tinged with red, 3–5-sulcate with lobes united the whole length; lobes inflated; pericarp thin, pubescent outside; aril red, cupular with crenate margins, thinly fleshy (Fig. 37C).

Queensland and New Guinea, chiefly coastal in Queensland from Cape York Peninsula to Logan River; common in light rainforests on granite hills and also on ridges behind dunes.

Papua New Guinea: CENTRAL DISTRICT: Tavai creek along Rigo Road 70 km SE of Port Moresby, May 1967, *Pullen* 6895. **Queensland:** COOK DISTRICT: Coen, in 1962, *Webb & Tracey* 7533; Oak Beach (16°42'S, 45°38'E), Apr 1966, *Hyland* 4065. NORTH KENNEDY DISTRICT: Clare-Burdekin levee, Jan 1949, *Smith* 4407. SOUTH KENNEDY DISTRICT: 8 km SE of Eungella Dam, Apr 1978, *Byrnes & Clarkson* 3622. PORT CURTIS DISTRICT: Curtis Island near Cape Keppel, Aug 1802, *Brown*. WIDE BAY DISTRICT: Northern branch of Burnett River about 8 km N of Bundaberg, Apr 1977, *Sharpe & Dowling* 2232. LEICHHARDT DISTRICT: Isla Gorge about 28 km SW of Theodore, Aug 1973, *Sharpe & Hockings* 684. BURNETT DISTRICT: Memerambi, Mar 1947, *Michael* 2997. MORETON DISTRICT: Mt French, 14.5 km W of Boonah, Aug 1973, *Durrington* 772; Upper Brookfield, Brisbane, Sep 1977, *Jessup* 4; Mar 1978, *Jessup* 77.

2. *Alectryon coriaceus* (Benth.) Radlk., Sapind. Holl.-Ind. 48 (1879); Domin, *Biblioth. Bot.* 89:902 (1927); Francis, *Aust. Rain-For. Trees* ed 3.249 (1970). Based on *Nephelium coriaceum* Benth., *Fl. Aust.* 1:466 (1863). **Type:** Brisbane River, *Fraser* (not seen).

Alectryon semicinereus (F. Muell.) Radlk., Sapind. Holl.-Ind. 118 (1879) Based on *Nephelium semicinereum* F. Muell., *Fragm.* 4:158 (1864); F. M. Bailey, *Qd Fl.* 1:303 (1899). **Type:** Rockingham Bay, *J. Dallachy* (BRI, iso).

Trees to 7 m; young parts and inflorescences with short white appressed hairs, others puberulent to glabrous. Leaves with 1 or 2(–3) pairs of usually opposite leaflets; petioles 1.5–4 cm long, semiterete or isobilateral; rachises 2–8 cm long, semiterete; pinnae elliptic, subobovate, elliptic-oblong or ovate-elliptic, often wider towards apex, tips rounded, obtuse, subacute, or retuse; margins entire; bases obtuse, oblique, 5.5–18.5 × 2.5–8.5 cm, glabrous above, glaucous, papillose, pubescent or puberulent below, thickly coriaceous; lateral nerves 8–18 pairs, usually oblique; petiolules 5–10 mm long, channelled above, pulvinate. Panicles 5–23.5 cm long and as wide, laxly branched; cymules 3–7-flowered. Flowers cream, 2.5–5.5 mm diam.; pedicels 1–3 mm long; calyces 2.5–3.5 × 1–2 mm, mostly shallowly or broadly lobed, lobes ovate, 1 × 1 mm, pubescent outside; petals white, 1–1.8 × 1–2 mm, suborbicular or broadly ovate, shortly clawed, deciduous; stamens 8–10, filaments 1–2 mm, pubescent, anthers to 2 mm long; ovaries subglobose, 3–5-lobed, velvety hairy, subsessile. Fruits suborbicular to depressed obovoid, ± retuse on top, abruptly narrowing into short stipe, 6–12 × 7–12 mm, 3(–5)-lobed; lobes subglobose somewhat divergent (at apex), turgid, rusty pubescent; pericarp thinly crustaceous; aril bright red, nearly covering seed, fleshy, cupular with lobed margins.

Chiefly coastal in littoral rainforests fringing seashore from northern Queensland to Port Stephens, New South Wales.

Queensland: COOK DISTRICT: S.F.R. 91 (16°—S, 145°—E), Jan 1957, *Volck*. WIDE BAY DISTRICT: Nikenbah, NE of Maryborough, Jun 1927, *Tryon*. MORETON DISTRICT: Russell Island, Moreton Bay, Apr 1927, *White* 3392; Coolum Beach, Dec 1976, *Sharpe* 2129. **New South Wales:** Harrington Inlet, Dec 1976, *Byrnes* 3491; Cudgen, Jan 1934, *White* 9672.

3. *Alectryon subcinereus* (A. Gray) Radlk., Sapind. Holl.-Ind. 117 (1879) & Sitzungsber. bayer. Akad. 9:524 (1879); Domin, Biblioth. Bot. 89:900 (1927). Francis, Aust. Rain-For. Trees ed 3.249 (1970). Based on *Cupania subcinerea* A. Gray, in Wilkes U.S. Explor. Expd. 15, Bot. 1:258 (1854). **Type:** Hunter River & Puen Bush, N.S.W. (not seen).

Spanoghea nephelioides F. Muell., Trans. & Proc. Philos. Inst. Vict. 3:25 (1859). **Type:** Moreton Bay, *Hill & Mueller* (not seen).

Nephelium leiocarpum F. Muell., l.c. 25 (1859) *pro syn.*; Benth., Fl. Aust. 1:467 (1863); F. M. Bailey, Qd Fl. 1:304 (1899). Based on *Spanoghea nephelioides* F. Muell.

A. laevis Radlk., Sapind. Holl.-Ind. 119 (1879) & in Engl. & Prantl, Nat. Pflanzenfam. 3,5 :333 (1895). **Type:** Clarence River, *C. Moore* (syntype K).

Trees to 10 m high, 35 cm girth; branchlets greyish; young parts, branchlets and inflorescences puberulent with pale appressed hairs. Leaves with (1-)2-4 shortly stalked leaflets on each side of rachis; petioles 1.5-3.5 cm long, semiterete, broad and pulvinate at trisulcate base; rachises 2-9 cm long, usually flattened and slightly margined; pinnae alternate, elliptic-oblong to elliptic-ovate, rarely wider towards apex, tips acute, shortly acuminate or subobtuse, margins entire or coarsely serrulate usually from above middle (serrate in juveniles), bases acute or subacute, 8-16.5 × 2-5.5 cm, upper surfaces ± shiny and glabrous, lower ones papillose, puberulent to glabrous, thinly coriaceous; nerves and reticulate venation usually somewhat coarse and prominent, lateral nerves 9-16 pairs, ± oblique; petiolules 1-3(-6) mm, puberulent, pulvinate. Panicles 10-15 cm long and as wide, laxly branched, densely flowered, peduncles minutely hairy; cymules 3-7=flowered. Flowers pink, 2-3 mm diam.; pedicels 2.5-4 mm long; calyces 1.5 × .5 mm, lobes ovate about 0.5 × 0.5 mm, pubescent; petals reduced, about 1.5 × 2 mm, obovate, scales as long; filaments to 1 mm long; anthers to 2 mm long; ovaries villous. Fruits subsessile, broadly obovate or transversely ellipsoid and mostly didymous, rarely 1- or 3-lobed, 8-10 × 8-16 mm, lobes globose, hard, turgid; pericarp thin, crustaceous, glabrous; seeds half enclosed in cupular fleshy, bright red aril.

Southeastern Queensland to East Gippsland, Victoria. Usually in dry rainforests along creeks, gullies and on steep slopes.

Queensland: WIDE BAY DISTRICT: Kin Kin, Mar 1916, *Francis & White*. MORETON DISTRICT: Mt Glorious, 50 km W of Brisbane, Jun 1978, *Jessup & Reynolds* 120; Mt Lindsay, Oct 1932, *White* 8566. **New South Wales:** 22 miles (33 km) NE of Singleton, Mar 1960, *Story* 7167; Bulli Pass, Oct 1927, *White*.

4. *Alectryon unilobatus* S. T. Reynolds, species nova a speciebus ceteris Australianis fructibus plerumque unilobatis differt. **Typus:** Cook District: North bank at mouth of Pascoe River (12°30'S, 143°16'E), in 1977, *L. J. Webb & J. G. Tracey* 13123 (BRI holotypus).

Trees to 10 m; young parts and inflorescences pubescent or puberulent, indumentum of short, pale rusty appressed hairs; branchlets with pale elliptic lenticels. Leaves with (2-)3-4 leaflets on each side of rachis; petioles and rachises terete, mostly glabrous; petioles 2-6 cm long, pulvinate; rachises 1.5-7(-8.5) cm; pinnae alternate or opposite, elliptic-ovate or obliquely elliptic-oblong, tips obtusely acuminate, shortly and abruptly acuminate, obtuse or acute; margins entire; bases acute or subacute, oblique, usually decurrent into petiolules, (4-)5.5-13 (-17.5) \times (1.5-)2-4(-5.5) cm, glabrous and often shiny above, puberulent or glabrous below; coriaceous, lateral nerves 9-18 pairs, slender, subpatent, looping away from margins, reticulate venation lax, fine, prominent; petiolules 2-7(-10) mm long, semiterete, pulvinate, puberulent or glabrous. Panicles 3.5-11 cm long and to 5 cm wide, laxly flowered; bracts puberulent on outside. Flowers (males) usually in 3-flowered cymules, to 3.5 mm diam.; pedicels to 3 mm long, puberulent; calyces 0.5- \times 1-3 mm, shallowly lobed, lobes broadly ovate, about 0.5 \times 1 mm, puberulent, or subglabrous outside; petals absent; filaments to 0.5 mm long, puberulent anthers to 1.7 mm long, papillose. Fruits sessile, 1-lobed, oblique, suborbicular, obovoid or ellipsoid, with lateral oblique apiculum or beak, 8-16 \times 8-12 mm, turgid, slightly carinate towards apex, also at margins when young, often reticulate; rarely fruits 2-lobed, then transversely ellipsoid, united the whole length with crescent shaped apices, to 8 \times 15 mm; pericarp usually thin, crustaceous, subglabrous on outside; seeds shiny, with cupular, fleshy, granular red aril (Fig. 37G).

Queensland, from two widely separated areas, Pascoe River in the north and around Gympie and Mt Nebo in south eastern Queensland, usually in vine thickets.

WIDE BAY DISTRICT: Wolvi S. F., 11 km ENE of Gympie, Jan 1976, *Cook*; Imbil, Jan 1918, *Weatherhead*. MORETON DISTRICT: Boombana N.P. near Mt Nebo, approx. 20 km W of Brisbane, Sep 1979, *Hegarty C3*.

The new species differ from the rest of Australian species in having mostly 1-lobed fruits. It is probably close to *A. reticulatus* Radlk. from New Guinea (ex descr.).

The southern collections vary a bit and differ from the northern one in having slightly larger fruits and more rigid leaflets. Until more collections are seen they are kept together because of the similarity of their fruits and leaves.

5. *Alectryon forsythii* (Maiden & Betche) Radlk. in Engl. & Prantl, Nat. Pflanzenfam. 3:205 (1907); Fedde Repert. 20:27 (1924); Domin, Biblioth. Bot. 89:902 (1927); Francis, Aust. Rain-For. Trees ed 3:248 (1970). Based on *Nephelium forsythii* Maiden & Betche, Proc. Linn. Soc. N.S.W. 26:81 (1901). **Type:** Tia Canyon, *J. H. Maiden & J. Kretschmann*; Tia & Aspley Canyon, *W. Forsyth*, (Syntypes not seen).

Trees to 8 m; young parts and peduncles puberulent with usually fine appressed hairs, others soon glabrous. Leaves with 1 or 2 pairs of opposite or subopposite leaflets; petioles and rachises usually semiterete, petioles 1.7-2.5 cm long; rachises 1-1.5 cm long, adaxially ridged; pinnae elliptic to elliptic-ovate, apices broad, obtuse or subacute, apiculate, margins entire, bases obtuse, decurrent, 4.5-6.5 \times 2.5-3.8 cm, upper surfaces shiny, glabrous, lower ones dull, somewhat greyish and papillose, puberulent or subglabrous; coriaceous and subrigid; lateral nerves 6-10 pairs, \pm patent, densely reticulate nerved; petiolules subterete, 3-8 mm long. Panicles to 7 cm long and as wide, few branched, peduncles dark violet, cymules 3-5-flowered; bracts small, ovate, ciliolate. Flowers dark red, about 5.5 mm diam.; pedicels 2-3 mm long;

calyces 2.5×5 mm, shallowly 5-lobed, lobes ovate obtuse, 1.5×1.5 mm, pubescent or puberulent inside, subglabrous outside; petals absent; disc crenulate, glabrous; filaments to 1 mm long, anthers 2.5–3 mm long; ovaries compressed, puberulent. Fruits subsessile, transversely ellipsoid or depressed obovoid, $6-10 \times 7-17$ mm, divaricately 2- or 3-lobed with lobes united the whole length, or 1-lobed then fruits subglobose; lobes compressed especially at margins; pericarp thinly crustaceous, glabrous; seeds slightly compressed, nearly enclosed in fleshy granular aril (Fig. 37A).

Northern Tablelands of New South Wales along coastal escarpments and rocky gorges, from Guy Fawkes River to Nundle, common around Tia Canyon (Walcha District).

New South Wales: Church Point, Wollombi Gorge, Feb 1979, *Floyd* 1201; Tia Falls, Oct 1900, *Forsyth & Cheel*; Walcha, Dec 1898, *Betche*.

6. *Alectryon kimberleyanus* S. T. Reynolds, species nova *A. subdentati* (F. Muell. ex Benth.) Radlk. primo aspectu maxime simile sed indumento crispato et fructibus sine lobis vel sulcis differt. **Typus:** Western Australia: Mitchell Plateau, Lone Dingo ($14^{\circ}35'S$, $125^{\circ}45'E$), Feb 1979, *J. S. Beard* 8484 (PERTH, holotypus).

Under shrubs to small trees to 3 m high; younger parts densely pubescent; branchlets ribbed towards apex, tomentose with pale \pm crispate hairs and longer straight hairs. Leaves plumb-red when young, 5–8 cm long (juvenile leaves to 13 cm long) including petiole, with 1 or 2 pairs of opposite leaflets; petioles terete or \pm flattened and broad at base, 0.5–2.2 cm long, pubescent to puberulent; rachises subterete or \pm flattened, adaxially ridged, 5–15 mm long, puberulent; pinnae obovate or obovate-elliptic, broad, obtuse or retuse at apices; margins entire (coarsely and irregularly dentate with long pungent points in juveniles); bases obtuse, truncate, unequal, $2-5.5 \times 1.4-2.6$ cm (juvenile leaflets to 7.5×4.5 cm; rachis 3 cm long), glabrous, shiny and darker above, paler, puberulent especially on the nerves or subglabrous below, thinly coriaceous; lateral nerves 8–10 pairs, subpatent, fine, reticulate venation prominent; petiolules slender, to 2 mm long, pubescent. Flowers not seen; fruiting peduncles 1–3.5 cm long. Fruits broadly depressed obovoid or ellipsoid to ovoid, $1-1.2 \times 1.8-2.3$ cm, turgid, slightly compressed at sutures, not lobed, 2- or 3-locular; pericarp thick, hard, woody, velvety hairy on outside; seed with cupular granular red aril (Fig. 37F).

In semi-deciduous microphyll vine thickets on Mitchell Plateau, west Kimberley, Western Australia.

Western Australia: Mitchell Plateau: towards Port Warrender, West Kimberley ($14^{\circ}34'S$, $125^{\circ}50'E$), May 1978, *Kenneally* 6675 (PERTH), & Surveyors Vine thicket ($14^{\circ}40'S$, $125^{\circ}45'E$), Jun 1976, *Kenneally* 5103 (PERTH).

The new species looks very similar to *Alectryon subdentatus* differing only in the somewhat crispate, dense, fine, pale hairs; thinner leaflets and fruits without lobes or grooves. The coarsely dentate margins of juvenile leaflets also have longer pungent points. The indumentum, colour and texture of leaflets are nearly that of *A. connatus*.

7. *Alectryon subdentatus* (F. Muell. ex Benth.) Radlk., Sapind, Holl.-Ind. 117 (1879) & Fedde Repert. 20:27–28 (1924); Domin, Biblioth. Bot. 89:960 (1927); Francis, Aust. Rain-Fort. Trees, ed 3:248 (1970). Based on *Nephelium subdentatum* F. Muell. ex Benth., Fl. Aust. 1:465 (1863); F.

M. Bailey, Qd Fl. 1:303 (1899) descr. only. **Type:** New South Wales: Tenterfield, C. Stuart; Tarampa Hill, *Leichhardt* (syntypes not seen).

Shrubs or trees to 7 m; young parts, branchlets and peduncles pubescent or puberulent with pale yellow usually villous appressed hairs. Leaves with (1-)2-4 pairs of usually accrescent opposite or subopposite leaflets, lowermost pair stipule-like and near stem in one form; petioles 0.2-2 cm long, subterete, trisulcate at base; rachises 1.5-4 cm long, subterete, adaxially ridged; pinnae elliptic, elliptic-obovate or obovate, tips broad, obtuse or subacute and gland-tipped, lowermost leaflets often apiculate with pungent point, margins closely or remotely serrulate or denticulate and gland-tipped (serrate in juveniles) rarely subentire or entire; bases oblique, cuneate, acute, obtuse or subtruncate, 0.7-9.5 × 0.5-3.2 cm, upper surfaces shiny, puberulent to subglabrous, lower ones paler (subglaucous when dry), opaque, papillose, puberulent especially on the nerves; coriaceous, subrigid; lateral nerves 6-14 pairs, subpatent with prominent reticulate venation; petiolules tumid, 1-2 mm long. Thyrsiform panicles to 6 cm long and nearly as wide, few branched. Female flowers usually in threes, pink or red, 1.5-3.5 mm diam.; pedicels 1-2 mm long, puberulent or pubescent; calyces cupular 0.7-2.2 × 1.5-3.5 mm, broadly and shortly lobed, lobes 0.5-0.7 × 0.7-1 mm, ovate, pubescent or puberulent; petals absent; disc glabrous, lobed; anthers 0.5-1.5 × 0.7-0.3 mm, sessile or filaments 0.3 mm long, glabrous; ovaries obovoid to obcordate, pubescent, 2- or 3-locular, style 0.3 mm long, 2- or 3-lobed at apex. Fruits sessile, usually 2-lobed, transversely ellipsoid, truncate on top, bisulcate or indistinctly lobed, or fruits 1-lobed and subglobose, 0.8-1.2 × 1.4-1.9 cm, often carinate or slightly compressed at margins, turgid; pericarp hard and subwoody, velvety hairy on outside; seeds in cupular, granular red aril.

Southeastern Queensland to Gloucester, New South Wales; in dry rainforests usually on steep rocky slopes.

Two forms are recognised:—

Lowermost pair of leaflets not stipule-like nor near base of petiole (at least 5-20 mm away from base of petiole). Apices obtuse or subacute, margins with few serrulations or denticulations, or subentire. Mature fruits puberulent. Flowers 3.5 mm diam. forma *subdentatus*

Lowermost pair of leaflets stipule-like and near base of petiole (to 5 mm away from base of petiole). Apices broad, obtuse, margins including apices with numerous gland-tipped denticulations or serrulations. Mature fruits velvety hairy. Flowers 1.5 mm diam. forma *pseudostipularis*

forma *subdentatus*

From Warwick to Gloucester, New South Wales.

Queensland: DARLING DOWNS DISTRICT: about 24 km NE of Warwick, Mar 1979, *Wilson*; Killarney, *Wedd* 1036. **New South Wales:** Curriecabark, 56 km W of Gloucester, Feb 1937, *Vickery*.

forma *pseudostipularis* Radlk., Fedde Repert. 20:28 (1924). **Type:** Toowoomba scrub, *Warburg* 19158 (not seen) (Fig. 37B).

WIDE BAY DISTRICT: Coongara Rock, 18 km S of Biggenden, Dec 1977, *Young* 6. BURNETT DISTRICT: Goodnight Scrub, Mt Perry, *Thow*. MORETON DISTRICT: Yarraman, Apr 1957, *Smith*; Benarkin, Apr 1924, *Cameron*; Flagstone Creek, 2.75 km SW of Stringbark Mt, Apr 1978, *Jahnke* 70. DARLING DOWNS DISTRICT: Crows Nest, Feb 1944, *Clemens*; Foothills of Bunya Mts, Feb 1980, *Hando* 138.

8. *Alectryon tomentosus* (F. Muell.) Radlk., Sapind. Holl.-Ind. 117 (1879); Domin, Biblioth. Bot. 89:901 (1927); Francis, Aust. Rain-For. Trees, ed

3.248 (1970). Based on *Nephelium tomentosum* F. Muell., Trans. & Proc. Philos. Inst. Vict. 2:64 (1858); Benth. Fl. Aust. 1:466 (1863); F. M. Bailey, Qd Fl. 1:303 (1899). **Type:** Brisbane River, *W. Hill & F. Mueller* (not seen).

Misapplied Name: *Nephelium subdentatum* F. Muell., Fragm. 9:99 (1875); F. M. Bailey, Qd Fl. 1:303 (1899). Specimens from Rockhampton *P. O'Shanesy* l.c. (1857); Tringilburra Ck, Bellenden Ker Exped. l.c. (1899).

Trees to 10 m; young parts, branchlets, leaves, peduncles and fruits densely pale yellow-rusty villous pubescent to puberulent. Leaves with 2–4 pairs of opposite accrescent leaflets; petioles 2–4.5 cm long, terete, pubescent to puberulent; rachises 3–7.5 cm long, terete, pubescent; pinnae mostly narrowly ovate-oblong or elliptic-oblong, lowermost (smallest) pair usually broadly ovate with truncate bases, tips obtuse, acute or acuminate, margins irregularly serrulate or serrate, bases oblique, obtuse or truncate, 4–14.5 × 2–6.5 cm, upper surfaces shiny, puberulent or glabrous with only midribs hairy; lower ones papillose, rusty villous pubescent or puberulent, often with scattered glands among the hairs; semicoriaceous; lateral nerves 10–16 pairs, patent; petiolules to 2 mm long. Panicles 2–14.5 cm long, 6.5 cm wide, laxly branched with slender racemiform branches; bracts ovate 1.5–2.5 mm long. Flowers cream, 2–4 mm diam.; pedicels to 1.5 mm; calyces 1.5 × 2.5 mm, lobes broadly ovate 1 × 1 mm, villous pubescent outside; petals absent; filaments 1–2 mm long, anthers 2 mm long; ovaries 2(–3)-lobed, densely white villous hairy; styles hairy; stigmas 2-lobed. Fruits sessile, broadly obcordate, transversely ellipsoid or subglobose, 8–12 × 8–22 mm, 1–3-lobed, lobes turgid, subglobose; pericarp quite thick, crustaceous, densely yellow brown hairy on outside with short tomentum intermingled with longer hairs; seeds in cupular, granular scarlet aril (Fig. 37D).

In coastal scrubs from Cape York Peninsula, Queensland, to Hunter River, New South Wales, extending inland to about 60 km from coast. Common in all types of rainforest.

Queensland: COOK DISTRICT: Galloways Ck, Bamaga, in 1962, *Webb & Tracey* 7137; McIlwraith Range, in 1974, *Hyland* 3087, Black Mountain (15°31'S, 145°14'E), Aug 1959, *Smith* 10713; Lizard Island, May 1975, *Byrnes* 3230. NORTH KENNEDY DISTRICT: Long Island, Jul 1935, *White* 12201; Kinnara Crater (18°25'S, 144°55'E), Jun 1969, *Hyland* 4781. PORT CURTIS DISTRICT: Gladstone, *Pulliene*. WIDE BAY DISTRICT: Wallaville, 48 km SW of Bundaberg, *Bancroft*; Imbil, Feb 1918, *Weatherhead*. BURNETT DISTRICT: Mt Perry, *Keys*. MORETON DISTRICT: Crows Nest, Oct 1921, *White*; Young's Crossing, Petrie, 29 km N of Brisbane, Jan 1931, *Blake* 2206.

Uses: This species is often cultivated as a shade and ornamental tree.

Note: Very variable species in indumentum and shape of leaflets.

9. *Alectryon repando-dentatus* Radlk., Engl. Bot. Jahrb. Syst. 56:274 (1920).
Type: New Guinea (not seen).

Trees to 10 m; young parts, branchlets, leaves, peduncles and fruits densely rusty villous pubescent to puberulent. Leaves with 1–3(–5) pairs of opposite or subopposite accrescent leaflets; petioles and rachises terete, rusty pubescent; petioles 2.5–5.5 cm long; rachises (1–)3.5–12 cm long; pinnae broadly oblong, obovate or elliptic; tips broad, obtuse or truncate and retuse rarely abruptly acute, margins and often apices remotely and irregularly denticulate; bases broad, truncate, suboblique and unequal, 6.7–12(–16) × 4.5–8.5(–11.5) cm, puberulent above, pubescent below, semicoriaceous; lateral

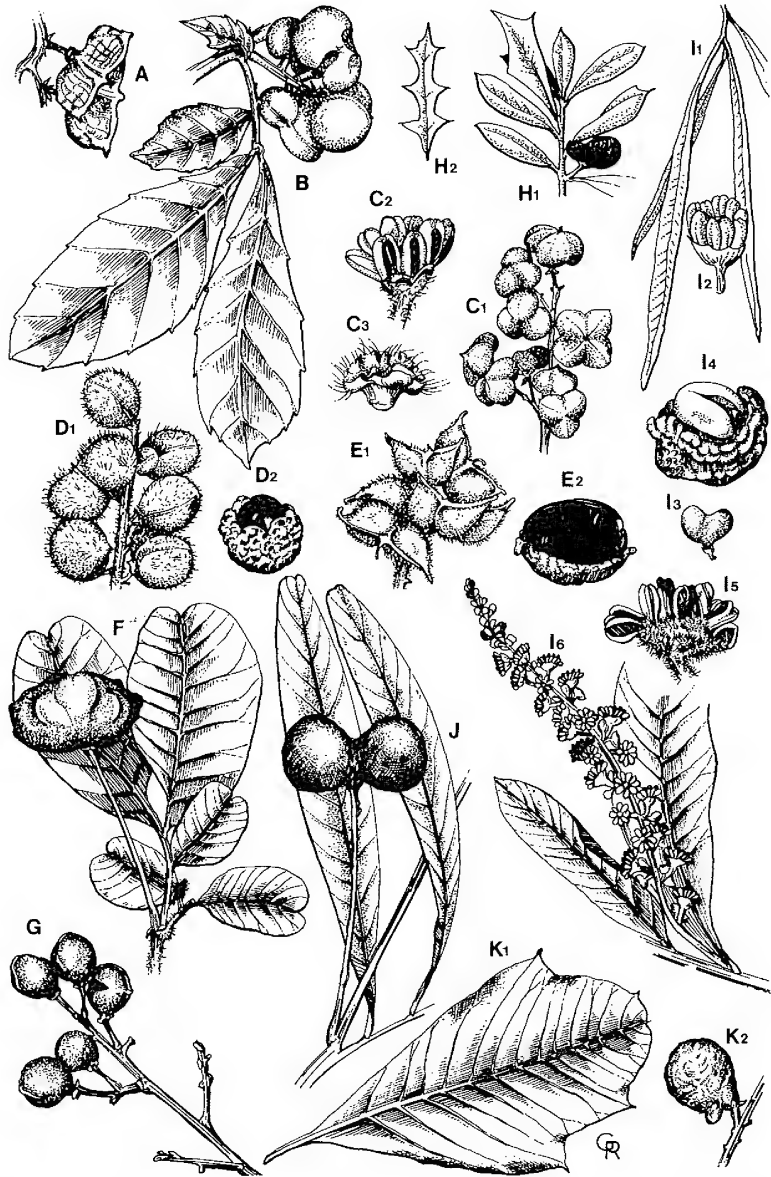


Figure 37. A-G *Alectryon* spp. A. *A. forsythii* fruits ($\times 1$); B. *A. subdentatus* forma *pseudostipularis*, fruiting branchlet ($\times 1$); C. *A. connatus*, C1 fruits ($\times 1$), C2 male flower ($\times 6$), C3 petal ($\times 12$); D. *A. tomentosus*, D1 fruits ($\times 1$), D2 seed with aril ($\times 1\frac{1}{2}$); E. *A. repando-dentatus*, E1 fruits ($\times 1$), E2 seed with aril ($\times 1\frac{1}{2}$); F. *A. kimberleyanus* fruiting branchlet ($\times 1$); G. *A. unilobatus* fruits ($\times 1$).

H.-K. *Heterodendrum* spp. H. *H. diversifolium*, H1 fruiting branchlet ($\times \frac{2}{3}$), H2 juvenile leaf ($\times \frac{2}{3}$); I. *H. oleifolium* I1-I4 *H. oleifolium* var. *microcalyx*, I1 leaves ($\times \frac{2}{3}$), I2 flower ($\times 6$), I3 fruit ($\times \frac{2}{3}$); I4 seed with aril ($\times 2$); I5 *H. oleifolium* var. *macrocalyx*, flower ($\times 3$); I6 *H. oleifolium* var. *oleifolium* flowering branchlet ($\times 1$). J. *H. tropicum* fruiting branchlet ($\times 1$). K. *H. pubescens*, K1 leaf ($\times 1$), K2 fruit ($\times 1$).

nerves 8–14 pairs, suboblique, bullate between nerves, reticulate venation lax; petiolules 4–6 mm, tomentose. Panicles 3.5–6.5 cm long and to 8 cm wide, male panicles with densely flowered spiciform branches when in bud; bracts ovate, about 1.5 mm long. Buds golden brown tomentose; flowers (males) minute, about 2 mm diam., pale yellow or white; pedicel to 1 mm long; calyces 2×2 mm, 4-lobed, lobes ovate obtuse, 1×1 mm, pubescent outside; petals absent; filaments to 2 mm long, villous; anthers to 1.2 mm long; rudimentary ovary villous. Fruits sessile, brownish, 7×14 – 16 mm, broadly obovoid, somewhat crescent-shaped at top, mostly 2-lobed, lobes obliquely ovoid, turgid, compressed towards apex and laterally elongated above to form a crest-like or narrowly triangular, flat, wing-like appendage usually with recurved tip; pericarp thinly crustaceous, rusty hairy with dense short tomentum and villous hairs; aril slightly granular (Fig. 37E).

New Guinea: Port Moresby, Mar 1972, *White* NGF 43914. **Queensland:** COOK DISTRICT: Murray Island, Torres Strait, Jul 1974, *Heatwole & Cameron* 644; Dowar Island, Murray Group, Jul 1974, *Heatwole & Cameron* 744.

This is a new record of the species occurring in Australia.

Excluded species

Alectryon bleeseri Schwarz, Fedde Repert. 24:89 (1927). **Type:** Port Darwin, *Blessner* No. 332 (not seen). From the description this appears to be identical with *Cupaniopsis anacardioides*.

Alectryon canescens DC., Prod. 1:617 (1824) = *Terminalia canescens* (DC.) Radlk.

HETERODENDRUM

Heterodendrum Desf., Mem. Mus. Hist. Nat. 4:8, t.3 (1818). **Type species:** *H. oleifolium* Desf.

Shrubs or small trees with simple leaves; indumentum of simple hairs. Leaves alternate or fasciculate, margins entire, remotely and irregularly dentate or pinnatisect. Inflorescences axillary, racemiform, paniculate or flowers solitary or in small clusters. Flowers usually bisexual, regular; pedicellate; calyces shortly and broadly cupular, shortly 5-lobed or margins irregularly toothed; petals absent; disc small, complete. Stamens 6–12, rarely more, exerted, glabrous, anthers as long as subulate filaments; ovaries 2–4-locular with 1 ovule per loculus. Fruits 1- or 2-lobed, lobes subglobose or ovoid, dry, \pm crustaceous or woody, indehiscent; seeds globose, shiny, black, half embedded in cupular, granular red aril.

Four species endemic to Australia.

1. Branchlets with appressed hairs. Leaves subglaucous, not dorsiventral, usually linear and long or narrowly obovate, margins entire, thickly coriaceous, rigid or drooping. Inflorescences open racemes or panicles or racemiform thyrses, often densely flowered. Fruit stipitate, obcordate, 2-lobed, deeply lobed at apex, or 1-lobed; pericarp thin 1. *H. oleifolium*
- Branchlets with short spreading hairs. Leaves green, dorsiventral, obovate, cuneate or obtusate, margins irregularly dentate or laciniately lobed with pungent points or entire, thinly coriaceous, \pm rigid. Flowers solitary, or in few flowered clusters or small racemes. Fruit sessile, transversely ellipsoid, often depressed on top, with 2, very divaricate lobes or 1-lobed, pericarp very thick 2
2. Fruits 1.3×2.8 cm, glabrous. Leaves 3.5 – 12×0.6 – 3 cm, narrowly obovate-oblong to subelliptic, obtuse or blunt at tips, margins entire, glabrous; petioles 4–6 mm. Inflorescences to 6 cm long 2. *H. tropicum*

Fruits 0.6–1.4 × 0.6–1.7 cm, glabrous or tomentose. Leaves 1.5–8.5 × 0.4–4.5 cm, narrowly obovate, cuneate, broadly obtrullate or obovate-elliptic, obtuse, truncate or tridentate at apices, usually mucronate, margins irregularly and coarsely dentate to laciniately lobed (especially in juveniles) to subentire or entire; glabrous or puberulous; petioles 1–6 mm. Flowers solitary, in small clusters or small racemes to 1 cm long..... 3

3. Branchlets, petioles and fruits puberulent to glabrous. Leaves narrowly obovate, obtrullate or obovate-elliptic, tips usually obtuse, 1.5–5.5(–6.5) × 0.4–1.5(–2) cm. Fruits mostly 2-lobed, 0.8–1.2 × 0.6–1.2 cm 3. *H. diversifolium*

Branchlets, petioles and fruits tomentose or pubescent. Leaves obovate, broadly cuneate or ± broadly obtrullate, tips broad, obtuse or truncate, 2.5–8.5 × 1.2–4.5 cm. Fruits mostly 1-lobed, 1.2–1.4 × 1.2–1.4 cm 4. *H. pubescens*

- 1. *Heterodendrum oleifolium*** Desf., Mem. Mus. Hist. Nat. 4:8, t.3 (1818); Benth., Fl. Aust. 1:469 (1863); Radlk., Sapind. Holl.–Ind. 49 (119) (1877); F. M. Bailey, Qd Fl. 1:307 (1899). **Type:** Western Australia, J. Baudin's Expd. (not seen).

Nepheium oleifolium (Desf.) F. Muell., Fragm. 10:82 (1876). Based on *Heterodendrum oleifolium* Desf.

Heterodendrum macrocalyx Radlk., Sapind. Holl.–Ind. 49 (119) (1879). **Type:** Murray River (not seen).

Heterodendrum microcalyx Radlk., Sapind. Holl.–Ind. 49 (119) (1879). **Type:** Flinders River (not seen).

Heterodendrum floribundum E. Pritzel, Fedde Repert. 15:358 (1918). **Type:** Central Australia, Hermannsburg at Finke River, *Strehlow* 43 (1906–1908) (not seen).

Heterodendrum oleifolium Desf. var. *euryphyllum* Domin, Biblioth. Bot. 89:902 (1927). **Type:** Hamersley Range, near Nichol Bay, F. Gregory's Exped. (not seen).

Shrubs or trees to 7 m, usually bushy with weeping or rigid branches; younger parts tomentose, young leaves densely sericeous hairy to subglabrous, branchlets, peduncles, and usually leaf surfaces with short white appressed hairs. Leaves usually linear and long, narrowly elliptic-oblong, attenuate at both ends or narrowly obovate-oblong, tips acute, acuminate obtuse or truncate; margins entire; bases acute decurrent into petiolules, 2–16.5 × 0.3–1(–2) cm, pubescent or puberulent, coriaceous, rigid, or drooping, midrib raised and broad below, lateral nerves suboblique, fine; petioles 0.5–1 cm, semiterete, usually hairy. Inflorescences racemiform or paniculiform 1.5–9 × 1.5–5 cm, peduncles pubescent to nearly glabrous; cymules 2–5-flowered. Flowers 4–6 mm diam.; pedicels 1.5–10 mm long; calyces 1.5–2.5 × 2.5–5 mm, broadly 5–10-toothed at margins, silky white hairy or glabrous; stamens 8–12, rarely more, filaments 1.5–4 mm long, anthers 2–2.5 mm long; ovaries shortly stipitate, 2–4-lobed, densely white tomentose to puberulent. Fruit obcordate, deeply 2-lobed at apex, and attenuating into short stipe at base, 0.8 × 1–1.2 cm, lobes ellipsoid or subglobose, rarely 1-lobed then to 8 × 6 mm; pericarp subwoody, hairy or glabrous (Fig. 37I).

Widespread in inland areas of all states except Tasmania. In open mixed forests, wilga and brigalow scrubs, on variety of soils.

Local name: Western Rose Wood or Boonaree, also known as Bullock Bush or Dogwood.

Uses: Boonaree is one of the most useful fodder trees in inland Australia

and sheep and cattle often thrive on it during drought periods but mortalities have been recorded in hungry sheep and cattle under stress (Everist 1969 & 1974).

H. oleifolium Desf. is a very variable species, 3 varieties are recognised here although the extreme forms merge into the other:—

1. Leaves 1.6–2.3 cm wide, 4.5–10 cm long, narrowly obovate, subobovate to elliptic; truncate or obtuse at apices; thick and rigid. Inflorescences mostly racemiform with clusters of shortly stalked 3-flowered cymules borne on a thick, usually erect peduncle; pedicels short and stout 2–4 mm long; calyces and ovaries pubescent. (Shrubs or trees with rigid branches)..... var. *oleifolium*
- Leaves 0.3–1(–2) cm wide, 2–16.5 cm long, linear and long narrowing at both ends, rarely narrowly obovate then plants very hairy; apices acute or obtuse; usually thin and ± drooping. Inflorescences few flowered, lax, open racemes or small panicles; peduncles and pedicels slender; cymules 2–5-flowered, usually on long stalks; pedicels 1.5–12 mm long; calyces and ovaries tomentose to subglabrous. (Small trees, branches often weeping).....2
2. Calyces 3.5–5 mm diam., tomentose with usually curved hairs. Branchlets, leaves and peduncles densely white tomentose to pubescent. Leaves narrowly elliptic or subobovate 2–7(–8.5) × 0.4–1(2) cm; young leaves sericeous. Inflorescences drooping, lax, 3–12-flowered; cymules 3-flowered; stalks of cymules 4–15 mm long. Pedicels 6–12 mm long; ovaries tomentose..... var. *macrocalyx*
- Calyces 2.5–3.5 mm diam., glabrous or puberulent. Branchlets, leaves and peduncles puberulous or subglabrous. Leaves linear and long, narrowly elliptic-oblong, 3.3–16.5 × 0.3–1 cm, young leaves thinly hairy. Inflorescences 5–32-flowered, cymules 2–5-flowered; stalks of cymules 1–5 mm long. Pedicels 1.5–5 mm long; ovaries puberulent..... var. *microcalyx*

H. oleifolium var. *oleifolium*

Western Australia. 107 miles [171 km] N of Carnarvon, May 1962, *Aplin* (PERTH); Dorre Island, NNE by N of White Beach Camp, Aug 1977, *Weston* (PERTH); 225 miles [360 km] N of Geraldton, near Wooramel River, May 1962, *Aplin* 1513 (PERTH).

The collection from Dorre Island closely resembles the line drawing of the type (Mem. Mus. Hist. Nat. 4:t3 (1818)). Capt. N. Baudin visited Shark's Bay during his voyage and it is possible that the type could have been collected around Dorre Island.

This variety appears to be the least collected. Domin's var. *euryphyllum* from Hammersley's Range, Nichol Bay (F. Gregory's Expedition) as far as description goes agrees with this variety. *H. floribundum* Pritzell also probably belongs here (see Fig. 37,16).

Heterodendrum oleifolium* var. *macrocalyx (Radlk.) Domin, *Biblioth. Bot.* 89:902 (1927). Based on *Heterodendron macrocalyx* Radlk., Sapind. Holl.-Ind. 49 (119) (1879). **Type:** Murray River (not seen) (see Fig. 37,15).

Western Australia. Kalgoorlie, Nov 1927, *White* 5161. Queensland. MITCHELL DISTRICT: "Budgerigar", 64 km SW of Yaraka and 80 km E of Windorah, Nov 1975, *Johnson* 3060. WARREGO DISTRICT: About 57 km E of Thargomindah near Dynevor Lakes, Nov 1954, *Smith* 6059; Dynevor Downs, Apr 1941, *White* 11788; Carrawin Station about 32 km SSE of Eulo, Nov 1954, *Smith* 6017. South Australia. Ooldea, Oct 1927, *White* 5164; Mt Lyndhurst, Sep 1898, *Koch*. Victoria. Culgoa, Jan 1923, *Grove*; Mildura, Oct 1928, *Williamson*.

Heterodendrum oleifolium* var. *microcalyx (Radlk.) Domin, *Biblioth. Bot.* 89:902 (1927). Based on *Heterodendron microcalyx* Radlk., Sapind. Holl.-Ind. 49 (119) (1879). **Type:** Flinders River (not seen) (see Fig. 37,11–14).

Common form in Queensland; also in Northern Territory and New South Wales.

Northern Territory. 40 km N of Lake Nash Station, May 1948, *Perry* 919; 8 km N of Alice Springs, Nov 1954, *Rose*; Palm Valley, 16 km S of Hermannsburg Mission, Mar 1953, *Perry*. **Queensland.** LEICHHARDT DISTRICT: 3 km S of Batheaston homestead on May Downs road, Nov 1968, *Auld* 3; 53 km E by N of Capella Township, Jun 1962, *Story & Yapp* 50; 7 km NE of Mt Sirloin, 93 km ENE of Springsure, Sep 1961, *Lazarides & Story* 127. DARLING DOWNS DISTRICT: 38 km W of Condamine River on Moonie Highway, May 1961, *Smith* 11318; About 10 km NW of Toobeah (28°24'S, 149°45'E), 14 Feb 1969, *Williams*. MARANO DISTRICT: Wallumbilla, Western Line, Sep 1925, *Francis*; Noondoo near Dirranbandi, Mar 1936, *Blake* 10656. **New South Wales.** 32 km from Gunnedah, *Swain*.

2. *Heterodendrum tropicum* S. T. Reynolds species nova affinis *H. diversifoliae* F. Muell. a qua differt foliis et fructibus multo majoribus glabris. **Typus.** Cook District: Mungana, Jun 1946, *H. Flecker* N.Q.N.C. No. 10423 (BRI, holotypus).

Small tree to 7 m. Young parts pubescent; branchlets hoary with spreading short hairs or glabrous, lenticellate. Leaves narrowly obovate-oblong to subelliptic-oblong, mostly broader towards apex, tips blunt or obtuse, margins entire, bases acute, cuneate, 3.5–12 × 0.6–3 cm, glabrous, coriaceous, nerves raised on both surfaces, lateral nerves oblique; petioles 0.4–0.6 cm. Flowers not seen. Fruiting peduncles 4–5 cm long. Fruits transversely ellipsoid, 2-lobed, 1.3 × 2.8 cm, lobes globose joined in the middle, or 1-lobed and to 1.3 × 1.6 cm, glabrous; pericarp hard and woody; seed with granular aril at base (Fig. 37J).

North Queensland, on limestone outcrops Chillagoe—Mungana area, usually in deciduous vine thickets.

COOK DISTRICT: Chillagoe, Jan 1918, *Michael*; 6.4 km N of Mungana, May 1970, *Webb & Tracey* 10202.

The new species has the indumentum and dorsiventral leaves of *H. diversifolium* F. Muell., but differs from it by having much larger and glabrous leaves and fruits; margins of leaves also always entire.

3. *Heterodendrum diversifolium* F. Muell., *Fragm.* 1:46 (1858), Benth., *Fl. Aust.* 1:469 (1863); Radlk., *Sapind. Holl.-Ind.* 49 (119) (1879); F. M. Bailey, *Qd Fl.* 1:307 (1899); Domin, *Biblioth. Bot.* 89:902 (1927). **Type:** Brigalow scrub, tropical and subtropical Eastern Australia (not seen).

Nephelium diversifolium (F. Muell.) F. Muell., *Fragm.* 10:82 (1876). Based on *Heterodendrum diversifolium* F. Muell.

Sparsely branched shrubs to 4 m; branchlets puberulent with short, white, ± erect spreading hairs. Leaves sometimes clustered on short branchlets, red when young, obovate-elliptic or narrowly obovate, cuneate or obtrullate, tips obtuse, usually mucronate, broadly tridentate and pungent pointed, or truncate, margins coarsely and irregularly dentate, usually with wide deltoid pungent pointed teeth (lacinate with narrowly triangular lobes in juveniles), subentire or entire, bases cuneate and decurrent, 1.5–5.5(–6.5) × 0.4–1.5(–2) cm, glabrous or subglabrous, thinly coriaceous with midrib and nerves prominent and raised on both surfaces; lateral nerves oblique; petioles 2–4(–6) mm long or leaves sessile. Inflorescences in axil of leaves or fallen leaves. Flowers 3.5 mm diam., solitary or in small clusters of about 6 flowers; pedicels 3 mm long; calyces 2.5 × 3.5 mm, lobes broadly ovate 1.5 × 1 mm, glabrous outside, puberulent inside, margins ciliolate; stamens 6–8, filaments 2.5 mm long, anthers 2 mm long; ovaries 2-lobed, pubescent to puberulent.

Fruits sessile, transversely ellipsoid or depressed obovoid with 2 very divaricate subglobose or ellipsoid lobes, 0.6–0.8 × 0.6–1.4 cm; or fruits 1-lobed, subglobose, 0.8–1.2 × 0.6–1.2 cm, puberulent to glabrous. Pericarp thick and woody (Fig. 37H).

Central and south-eastern Queensland usually in brigalow scrubs on dark clay.

SOUTH KENNEDY DISTRICT: 140 km NW of Clermont, Jun 1977, *Dale* 102. PORT CURTIS DISTRICT: Wood End, Rockhampton District, Mar 1920, *Francis*. LEICHHARDT DISTRICT: Turrwalla about 64 km NW of Nebo, May 1962, *Johnson* 2362; Wandoan, Nov 1930, *Hubbard* 5042. BURNETT DISTRICT: Monto, Nov 1965, *Malcolmson*. MORETON DISTRICT: Kalbar, S of Ipswich, *Smith*; Maroon, Feb 1936, *Michael* 2273. DARLING DOWNS DISTRICT: Paldaro, W of Miles, Feb 1935, *Blake* 7621; Dalby-Chinchilla Rd about 9.6 km SE of Chinchilla, May 1970, *Moriarty* 177; Wyaga, Goondiwindi District, Sep 1919, *White*. MARANOVA DISTRICT: Wallumbilla, May 1916, *White*.

Common name: Scrub Boonaree or Holly Bush.

4. *Heterodendrum pubescens* S. T. Reynolds *H. diversifoliae* F. Muell. affinis a qua differt ramulis, fructibus dense pubescentibus et folis plerumque late cuneatis. **Typus.** Burnett District: Eidsvold, Sep 1915, *Dr. T. L. Bancroft* (BRI holotypus).

Trees to 6 m tall; young parts, branchlets, petioles and fruits densely tomentose or pubescent with pale short dense spreading hairs intermingled with scattered longer and usually appressed hairs. Leaves obovate, broadly obtusate or cuneate, tips broad, truncate, obtuse or retuse, usually apiculate; margins coarsely and irregularly serrate or serrulate usually above middle, subentire to entire, rarely deeply and broadly lobed and pinnatisect, teeth broad, pungent pointed; bases cuneate, decurrent, 3.5–9 × 1.5–4.5 cm, surfaces puberulent or subglabrous, midribs below usually puberulent, green, thinly coriaceous, somewhat rigid, nerves and reticulation prominent and raised on both surfaces; petioles 3–10 mm long; Flowers to 3.5 mm diam., solitary in each axil or in a few flowered racemose inflorescences which are up to 2.5 cm long and 3–7-flowered; pedicels 5–10 mm long, puberulent; calyces cupular, 2 × 3.5 mm, lobes ovate 1.5 × 1.5 mm, puberulent; stamens 8, glabrous, filaments 1.5 mm long, anthers 1.5 mm long; ovaries 2(or 3)-lobed, tomentose, styles bifid at apex. Fruits mostly 1-lobed, this obliquely subglobose or ellipsoid with aborted lobes towards base, 1.2–1.4 × 1.2–1.4 cm, if 2-lobed then lobes divaricate; pericarp thick, hard, woody, pale rusty, velvety hairy on outside (Fig. 37K).

Southeastern Queensland. Usually on rocky outcrops at edge of forests.

BURNETT DISTRICT: "Brian Pastures" near Gayndah, Mar 1952, *Blake* 18913. DARLING DOWNS DISTRICT: Mt Russel, 16 miles [26 km] SW of Oakey, in 1963, *Hockings* 17.

Differs from *H. diversifolium* in having densely pubescent branchlets and fruits, leaves also usually broadly cuneate.

COSSINIA

Cossinia Commerson ex Lam., *Encycl.* 2:132,t.265 (1786); Poir. in Lam. *III. Gen.* 1.2:398, n.704, t.256 (1792); Benth. & Hook. f., *Gen. Pl.* 1:397 (1867); Baillon, *Nat. Hist. Pl.* 5:364–366, t.393–396 (1878); Radlk., in *Engl. Pflanzenr.* 98g:1337–1341,t.41 (1933) **Type species:** *C. pinnata* Commerson ex Lam. (lectotypus novus).

Melicopsidium Baillon, *Adans.* 11:423 (1874) & *Nat. Hist. Pl.* 5:407 (1874).

Type species: *M. trifoliatum* Baillon.

Shrubs or small trees with saponin in bark and fruits; indumentum of two types of stellate hairs, denser fine pale \pm sessile ones with few scattered darker, coarser, larger stipitate ones. Leaves pari- or impari-pinnate; leaflets 3-7, with apiculate callous tips, entire, semicoriaceous. Inflorescences terminal or axillary, thyrsoid, ultimate cymules cincinnate; bracteate. Flowers unisexual and probably mostly monoecious, irregular; pedicellate; calyces 5-sect, lobes imbricate; petals 4-6, imbricate, shortly clawed, membranous; scales and crests absent; disc unilateral or regular; stamens 5-8, excentric, anterior to disc, glabrous, filaments exerted in males; ovaries stipitate, anterior to disc, trisulcate, 3-celled with 2 ovules in each cell, attached to central axis, superposed; styles terminal, filiform, stigmas \pm capitate. Capsules 3-sulcate or 3-lobed, apiculate (residual style); lobes inflated, loculicidally 2-valved, septifragal; valves somewhat crustaceous, hairy outside, glabrous inside; seeds 2 in each locule, suborbicular, compressed, exarillate; embryo spirally convolute.

Four species, Mascarene Islands, New Caledonia, Fiji and eastern Australia. One in Queensland, this being a new record of the genus for Australia.

Cossinia australiana S. T. Reynolds species nova *C. triphyllae* Commerson ex Lam. et *C. pinnatae* Commerson ex Lam. affinis a quibus foliis inflorescentis et floribus minoribus, petalis quinque differt. **Type:** Wide Bay District: Bingera, 26 Oct 1948, *L. S. Smith* 4140 (BRI holotypus).

Small trees to 7 m tall and 10 cm girth, usually slender, few branched with twiggy crown; young parts, branchlets, lower surface of leaves, inflorescences and fruits densely covered with white, appressed, fine, \pm sessile stellate hairs and scattered stipitate, large (to 0.5 mm across), coarse, yellow-brown or rusty tufted hairs; branchlets terete, ribbed towards apex, lenticellate. Leaves with petiole 5-15 \times 4.5-14.5 cm, with 3-5(-7) usually opposite leaflets decreasing in size from apex to base; petioles 1.2-4.3 cm long, terete, slightly winged towards apex, trisulcate at base; rachises 0.5-4.5 cm long, subterete, pubescent especially below, narrowly winged; wings to 2 mm wide, foliaceous, broad at apex and tapering to base between each pair of leaflets; pinnae narrowly elliptic-oblong or subobovate-oblong, sometimes subfalcate, tips acute, subacute, obtuse or acuminate, apiculate, margins slightly recurved, bases acute, usually oblique, 2-7.5 \times 0.9-2.8 cm, puberulent or glabrous above, midribs usually hairy, tomentose below with coarser large stipitate rusty tufted hairs especially dense on nerves and margins; lateral nerves 8-14 pairs, subpatent, sometimes slightly impressed above; midribs channelled above; petiolules to 2 mm long, channelled above, tomentose. Panicles subterminal or in upper axils, densely flowered, corymbiform, 2-5 cm long and as wide, peduncles slender, ultimate cymules 3-8-flowered; bracts linear-oblong 2.5-4 \times 0.5 mm, tomentose outside. Flowers 5.5 \times 6-7 mm; pedicels 2-4 mm long (to 7 mm in fruit), pubescent; calyx lobes broadly ovate to oblong, 3-4.5 \times 1-1.5 mm, tomentose outside, puberulent especially towards base inside with fine white hairs; petals 5, broadly ovate-oblong, apices rounded, slightly auricled or obtuse at base, 4.5-5.5 \times 1.5-3 mm, tomentose outside, puberulent inside with fine white hairs; disc patelliform, depressed in centre, very oblique with one side pushed in and projected into a lobed ridge, margins crenate, glabrous; stamens 8, filaments subuliform to 7 mm long (staminodes to 4 mm long with reduced anthers), anthers ellipsoid, 1.2 \times 0.6 mm; ovaries subobovoid, pubescent, styles pubescent; ovules \pm reniform. Capsules stipitate, obovoid-obcordate, attenuate at base, 1.5-1.8 \times 1.2-1.6 cm, pubescent; lobes

ellipsoid-oblongoid attenuating at base, slightly and finely ridged at sutures; stipe 3–4 mm long; calyx lobes usually not persistent (Fig. 38).

Central and southeastern Queensland, usually on red volcanic soil in scrub relicts.

PORT CURTIS DISTRICT: Milman near Rockhampton, Apr 1952, *Webb* 1549. WIDE BAY DISTRICT: Theebine near Gympie, Jan 1957, *King*.

The new species appears to be closely related to *C. pinnata* Commerson ex Lam. (ex descr. & icon.) from Mascarene Island. It differs only in having smaller leaves, inflorescences and flowers; petals are also 5 rather than 4 and sepals usually not persistent in fruit. It is comparable to *C. trifoliata* Radlk. (ex descr.) from New Caledonia in size of leaves, inflorescences and flowers; also in the 5 petals but the disc in this species is regular and the number of stamens is 5. Until collections of both *C. pinnata* and *C. trifoliata* are seen *C. australiana* is treated here as being distinct from both.

C. pacifica A. C. Smith from Fiji differs from all the described species in having very large leaves, large leaflets and usually 6 petals.

The following key based on Radlkofer's two sections may help to differentiate the species:

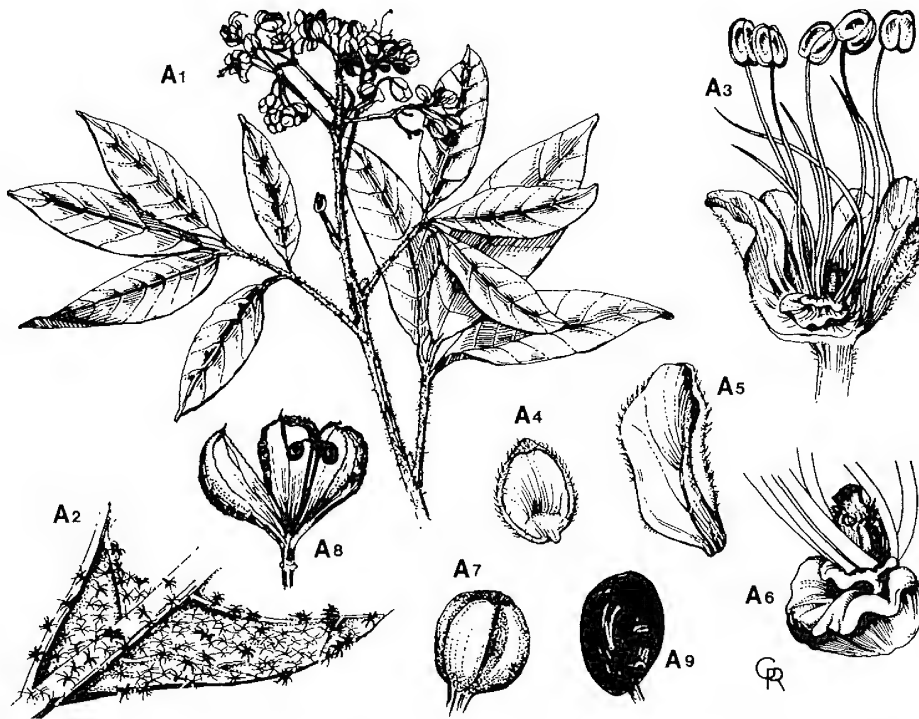


Figure 38. *Cossinia australiana*, A1 flowering branchlet ($\times 1$), A2 detail of portion of leaflet ($\times 6$), A3 male flower with 2 sepals and a petal removed ($\times 6$), A4 sepal ($\times 6$), A5 petal ($\times 6$), A6 disc ($\times 12$), A7 fruit ($\times 1$), A8 dehiscent fruit showing seeds ($\times 1$), A9 seed ($\times 6$).

Sect. 1 *Cossinia*. Disc unilateral; petals 4–6.

1. Leaves with petiole 30–35 cm long; leaflets 7–18 × 3–6 cm. Petals 5 or 6. *C. pacifica* A. C. Smith
 Leaves with petiole 5.5–20 cm long; leaflets 2–12 × 0.9–4 cm. Petals 4 or 5. 2
 2. Leaves with petiole 7–20 cm long; leaflets 4–12 × 2–4 cm. Inflorescences 6–14 cm long. Flowers 12 mm diam.; petals 4; stamens 5 or 6(–8). Fruits with persistent sepals *C. pinnata* Commerson ex Lam. (incl. *C. triphylla* Commerson ex Lam.)
 Leaves with petiole 5.5–15 cm long; leaflets 2–7.5 × 0.9–2.8 cm. Inflorescences 2–5 cm long. Flowers 6–7 mm diam.; petals 5; stamens 8. Fruits usually without persistent sepals *C. australiana*
- Sect. 2. *Melicopsidium* (Baillon) Radlk. Disc regular; petals 5 *C. trifoliata* Radlk.

LEPIDEREMA

Lepiderema Radlk., Actes Congr. Bot. Amsterd. (1877):250 (1879); & in Engl., Pflanzenr. 98f:1216–1218 (1933). **Type species:** *L. papuana* Radlk.

Shrubs or trees; usually glabrous, indumentum if present of simple straight hairs. Leaves paripinnate; leaflets opposite or alternate, 1–16(–19)–paired, margins usually entire, upper surfaces with appressed often lepidote glands; petiolules usually pulvinate. Inflorescences racemiform or paniculiform thyrses, axillary, in the axil of upper leaves or of fallen leaves or ramiflorous, solitary or a few in a cluster, mostly small, laxly flowered, cymes stalked; bracts small, ovate. Flowers small, regular, unisexual and probably monoecious; pedicels usually articulate about the middle; calyx 5-sect, lobes 2-seriate, imbricate, outer ones smaller; petaloid with pale margins, usually broadly elliptic, concave, hyaline, glabrous, ciliate; petals 5, similar to sepals, glabrous; scales, crests or thickenings absent; disc regular, glabrous; stamens 6–8, exerted in males, filaments subulate, usually hairy, anthers oblongoid, glabrous; ovaries subsessile, ellipsoid, 3-locular with a solitary ovule in each cell, glabrous; styles terminal, slender, stigmas 3-lobed. Capsules usually small and subglobose; or obovoid or obcordate with turbinate base, apiculate (residual style); glabrous, usually drying blackish or brown, and red at junction of valves, 3-valved; valves thick, ± woody; seeds ellipsoid or oblongoid; aril fleshy or thin, oily, mostly obliquely attached to ± ventral side of seed and often totally covering it, drying papery.

Eight species Australia and New Guinea; 6 (3 new) in eastern Australia.

1. Leaflets 9–16(–19) on each side of rachis. 2
 Leaflets (1)–2–6(–9) on each side of rachis 3
2. Branchlets densely rusty hirsute pubescent to puberulent. Leaflets 16–19–paired, margins subentire or remotely crenulate-serrulate especially towards apex, 6.5–19.5 × 0.8–3.8 cm. Inflorescences to 7 × 4.5 cm, laxly flowered. Capsules obcordate-turbinate, widely lobed at apex 1. *L. hirsuta*
 Branchlets glabrous, if hairs present not as above. Leaflets 9–12–paired, margins entire (slightly serrulate only in juvenile ones), 8–18 × 2–5.2 cm. Inflorescences 13–40 × 19–37 cm, densely flowered. Capsules obovoid, not lobed at apex 2. *L. largiflorens*
3. Leaflets 2–4–paired, 5–16.5 × 2.2–6.3 cm. Inflorescences 2–4.5 cm long. Capsules subglobose 3. *L. sericolignis*
 Leaflets 1–6(–9)–paired, 4–8.5 × 1.2–3.5 cm. Inflorescences 3.5–29 cm long. Capsules subglobose or obovoid 4
4. Leaflets subsessile or petiolules to 3 mm long; surfaces rarely obscurely and minutely pellucid dotted. Peduncles and pedicels not glandular tuberculate. Leaflets 4–8 ×

1.2–2 cm, narrowly and obliquely ovate-oblong, tapering at tips, falcate. Capsules subglobose 4. *L. pulchella*

Petiolules 3–12 mm long; surfaces prominently pellucid dotted. Peduncles and pedicels glandular tuberculate, viscid. Leaflets 3.5–8.5 × 1.5–3.7 cm, ovate or obliquely ovate-oblong, tips acute or acuminate. Capsules subglobose or obovoid 5

5. Capsules obovoid, attenuate at base, retuse or truncate at apex, 1–1.6 × 1.3–1.6 cm (young ones obcordate, with 3 compressed lobes on top), very viscid. Calyx lobes persistent in fruit. Leaflets 4–9–paired, midribs usually not excentric, mostly hairy. Petals not gland-dotted 6. *L. ixiocarpa*

Capsules subglobose, depressed on top, 1 × 1–1.2 cm, not viscid. Calyx lobes not persistent. Leaflets (3–)4–5–paired, midribs usually excentric, glabrous. Petals gland-dotted 5. *L. punctulata*

1. **Lepiderema hirsuta** S. T. Reynolds, species nova differt a speciebus omnibus ceteris Australiensibus ramulis, petiolis rachibus ferrugineis hirsutis et foliis numeris angustis marginibus serrulatis praeditis. **Typus.** Cook District: Oliver Creek, tributary of Noah Creek, 21 Aug 1972, *L. J. Webb & J. G. Tracey* 10891 (BRI holotypus).

Small trees to 10 m; young parts, branchlets, often petioles and rachises densely ferrugineous hirsute pubescent to puberulent; branchlets fluted, resin-dotted, lenticellate. Leaves with 16–19 pairs of leaflets, decreasing in size at both ends; petioles 4.5–16 cm long, terete, trisulcate at base; rachises 19–57 cm long, subterete; pinnae alternate or opposite, narrowly oblong-ovate or elliptic-ovate, tapering and subcaudate or bluntly acuminate at apices, margins subentire or remotely crenulate-serrulate especially towards apex, bases oblique, mostly obtuse or truncate on one side, obtuse on other, 6.5–19.5 × 0.8–3.8 cm, glabrous or subglabrous, midribs usually hairy, pellucid dotted especially below, lateral nerves 17–34 pairs, subpatent, slender, mostly impressed above, raised below; petiolules 2–3 mm long, pulvinate, pubescent. Panicles ramiflorous and clustered, 10–14 per cluster, few branched and laxly flowered, 6–7 cm long and to 4.5 cm wide, cymules 2–5-flowered; bracts to 1 × 0.5 mm, resin-dotted. Flowers pink, males 5 mm diam., females not seen; pedicels 3 mm, obconical, gland-dotted; calyx lobes elliptic or obovate, 3–4.5 × 1.5–2.5 mm, outer ones gland-dotted; petals broadly ovate-elliptic, 2.5 × 1.5 mm; filaments subulate 1.5–2 mm long, pilose, anthers oblongoid, 1.5 × 1 mm. Capsules showy, reddish pink, 1.8–2 × 1.5–1.8 cm, obcordate-turbinate attenuate at base, widely lobed at apex, raised in centre, the persistent style forming a thickened apiculate cone, compressed and wing-like at sutures; aril ventrally elongated, nearly enclosing seed; calyx lobes persistent (Fig. 39A).

Northern Queensland around Arsenic Creek, in rainforests, alt. about 100 m, on alluvial soil.

COOK DISTRICT: Arsenic Creek (16°10'S 145°25'E), Sep 1977 *Stocker* 1586; Nov 1977, *Stocker* 1623.

The species differs from all the other Australian species in having ferrugineous hirsute branchlets, petioles, rachises and numerous narrow leaflets with crenulate serrulate margins.

2. **Lepiderema largiflorens** S. T. Reynolds, species nova differt a ceteris inflorescentia grandi multiflora. Accedit *L. hirsutum* numero et forma foliorum autem marginibus plerumque integris. **Typus.** Cook District: Bartle Frere, May 1952, *K. J. White* 198 (BRI, holotypus).

Shrubs or small trees to 7 m high, trunk to 3 cm diam., bark greyish, mottled; young parts puberulent and somewhat viscid, to subglabrous. Leaves with 9–10(–12) leaflets each side of rachis, narrowing at both ends; petioles 6.5–9(–15) cm long, terete, pulvinate and trisulcate at base; rachises 28–32.5(–37.5) cm long terete; pinnae alternate, narrowly elliptic-ovate or oblong-ovate, oblique, tapering and bluntly acuminate or abruptly acuminate at apices, margins entire, (serrulate especially towards apex in juveniles), bases broad, rounded or obtuse, unequal, 8–18 × 2–5.2 cm, glabrous or subglabrous except hairy, ± excentric midribs, semicoriaceous, pellucid dotted below; lateral nerves 12–16 pairs, arcuate and ascending at tips, often impressed above, bullate between nerves; petiolules 4–8 mm long, slender, subterete, flexuose, pulvinate. Panicles ramiflorous, 13–40 × 19–37 cm, divaricately branched, densely flowered; peduncles ribbed, puberulent with short spreading hairs, cymules 3–5-flowered. Flowers cream, 6–8 mm diam.; pedicels 3–4 mm long, puberulent, gland-dotted; calyx lobes elliptic-oblong to suborbicular 2.5–4 × 1.8–4 mm, membranous, glabrous; outer ones gland-dotted; petals subobovate, 2.5–3 × 2 mm; filaments to 2 mm long, densely hairy towards the middle, anthers ovoid-oblongoid 1.5–2 × 1 mm; ovaries ellipsoid, style thick, 3-grooved at apex. Capsules obovoid, indistinctly 3-sulcate, obtuse or truncate on top, apiculate, 1.3–1.5 × 1.2 cm; seed slightly compressed ventrally, aril membranous, ventral; calyx lobes mostly persistent (Fig. 39F).

Northern Queensland, around Atherton Tableland, in rainforests.

COOK DISTRICT: S.F.R. 755, Gosschalk L.A. (17°25'S 145°47'E), May 1976, *Hyland* 8798; S.F.R. 755, Barong L.A. (17°31'S 145°50'E), Sep 1976, *Fitzsimon* 115; Topaz near Malanda, Aug 1947, *Smith* 3309.

The species differ from the rest in having a large copiously flowered inflorescence. It approaches *L. hirsuta* with respect to number of leaflets and shape but margins are usually entire.

3. *Lepiderma sericolignis* (F. M. Bailey) Radlk., Fedde Repert. 20:29 (1924); & in Engl. Pflanzenr. 98f:1217 (1933). Based on *Cupania sericolignis* F. M. Bailey, Qd Bot. Bull. 5:11 (1892), & Qd Fl. 1:294 (1899), descr. only (specimen from Mulgrave River is *Guioa acutifolia*). Type: Cook District: Barron River, near Cairns, *E. Cowley* (BRI, holo).

Small trees to 4 m; glabrous. Leaves with 2 or 3(–4) pairs of leaflets, accrescent towards the tip; petioles 2–7 cm long, terete; pulvinate; rachises 4–14 cm long, terete; pinnae opposite or subopposite, elliptic– to ovate-oblong, obtuse or abruptly and shortly acuminate at apices; margins entire; oblique, acute, subcuneate or obtuse at base, 5–16.5 × 2.2–6.3 cm, coriaceous; lateral nerves 7–12 pairs, subpatent, midribs ridged above; petiolules 3–7 mm long, pulvinus as long. Inflorescences 2–4 together on old wood, racemiform, 2–4.5 cm long, few flowered. Flowers (male) white, 3–4 mm diam.; pedicels 2 mm, glabrous; calyx lobes elliptic, hyaline, 1.5–2.5 × 1–2 mm; petals ovate-oblong, 1.5–2 × 1 mm, puberulent towards base outside; filaments 1–1.5 mm, villous towards base, anthers to 1.3 mm long. Female flowers not seen. Capsules subglobose or subellipsoid, obscurely 3-sulcate, apiculate at obtuse apex, 1–1.5 × 1–1.4 cm, apricot on outside, dull red inside especially at junction of valves; aril suboblique, developed ones not seen; calyx lobes persistent (Fig. 39B).

Northern Queensland, from Mossman to Mt Fox, often in riverine rainforest or on borders of mangroves.

COOK DISTRICT: Mossman Gorge, W of Mossman, Jun 1972, *Wrigley & Telford* NQ 1164; Baileys Creek, on bank of Hutchison Creek, abt. 12 km E.N.E. of Daintree, Oct 1962, *Smith*

11587; Portion 130A Northern bank of Daintree at Ferry Crossing, Nov 1975, *Hyland* 7045; *Johnstone River, Nov 1915, *Michael*; *Fenby's Place, (approx. 17°S, 145°E), Dec 1948, *Clemens*. NORTH KENNEDY DISTRICT: *Mt Fox, Dec 1949, *Clemens*.

*These three collections differ from the rest in having leaflets with less distinct reticulate venation and the lateral nerves impressed above. Until more collections are seen they are tentatively kept together as the shape of leaflets and fruits are the same.

Common name: Silkwood.

4. *Lepiderema pulchella* Radlk., in Engl. & Prantl. Nat. Pflanzenfam. 3:206 (1907); Fedde Repert. 20:30 (1924); & in Engl. Pflanzenr. 98f:1218 (1933) Domin, Biblioth. Bot. 89:905 (1927). **Type:** cultivated specimen, Sydney Bot. Garden, from unknown locality, *Maiden* (not seen).

Small trees to 15 m; glabrous; branchlets slightly \pm viscid. Leaves with (1-)2-4 pairs of leaflets; petioles 1.4-2.5 cm, usually semiterete, pulvinate; rachises 2-6.5 cm long, semiterete; pinnae opposite to alternate, narrowly oblong-ovate, or -subobovate to elliptic, falcate, usually tapering towards the apex and bluntly acuminate, margins entire, bases oblique, acute, decurrent into petiolules, 4-8 \times 1.2-2 cm, semicoriaceous, minutely punctate; midrib raised on both surfaces, lateral nerves 8-10 pairs, very fine and usually indistinct; petiolules to 3 mm long. Panicles axillary, solitary or a few together, 5.5-12 \times 3-6.5 cm, branching from base, cymules 2- or 3-flowered. Flowers yellow-orange, 5-6 mm diam.; pedicels 2-3.5 mm long, glabrous; calyx lobes pale yellow, elliptic, 1.5-3.5 \times 1-2.5 mm; petals obovate-oblong, 3 \times 2.5 mm; filaments hairy below middle, 2-3.5 mm long, anthers oblongoid; ovaries subglobose, styles to 0.5 mm. Capsules subglobose, apiculate, brownish, to 1 \times 1 cm, shortly stipitate; aril yellow (Fig 39C).

Southeastern Queensland to Tweed River, northern New South Wales; on creek and river banks at edge of rainforests.

Queensland: MORETON DISTRICT: Currumbin Ck, Sep 1980, *Bird*; & Oct 1980, *Jones*; Warrie N. P., Springbrook, junction of Mudoora and Canyon Creek, Jun 1978, *McDonald* & *Jessup*. New South Wales. Hopkins Creek, near Murwillumbah, Sep 1965, *Lemaire*; Terranora, Dec 1961, *Tricks*; Stotts Island, 2.4 km E of Tumbulgan, Aug 1972, *Coveny* & *Armstrong* 4354.

5. *Lepiderema punctulata* (F. Muell.) Radlk., Fedde Repert. 20:30 (1924); & in Engl. Pflanzenr. 98f:1218 (1933); Based on *Cupania punctulata* F. Muell., Fragm. 3:12 (1862); Benth., Fl. Aust. 1:458 (1863). **Type:** Cumberland Islands, *E. Fitzalan* (not seen).

Ratonia punctulata (F. Muell.) F. Muell., Fragm. 9:91 (1875); F. M. Bailey, Qd Fl. 1:297 (1899). Based on *C. punctulata* F. Muell.

Cupaniopsis punctulata (F. Muell.) Radlk., Sitzungsber. bayer. Akad. 9:530, n 359 (1879). Based on *C. punctulata* F. Muell.

Trees to 10 m; glabrous; young parts slightly viscid. Leaves with 3-5 leaflets on each side of rachis; petioles 2.5-4.5(-7) cm long, terete, pulvinate; rachises 4.5-8.5 cm long, subterete, adaxially ridged; pinnae subopposite or alternate, obliquely ovate-oblong, tips acuminate or acute, bases very oblique, abruptly obtuse and narrowing and decurrent into petiolules, 3.5-8 \times 1.5-3.3 cm, semicoriaceous, pellucid punctate; usually shiny, scurfy and with pale bloom above; midribs usually excentric, flat or slightly ridged above; lateral nerves 8-12 pairs, suboblique, looping at margins, distinct on both surfaces, reticulate venation lax, prominent; petiolules semiterete, 0.3-1.2 cm, pulvinate. Inflorescences ramiflorous, on short lateral branches or in upper

axils, 3.5–9.5 × 1–7 cm, usually branching from the base, laxly flowered, cymules 3–5-flowered, peduncles slender, resin-dotted. Flowers (male only seen) 4–5 mm diam.; pedicels 1–1.5 mm long, gland-dotted, glabrous; calyx lobes broadly elliptic, suborbicular or broadly ovate, gland-dotted, 1.5–2.5 × 1–2 mm; petals subobovate 2–2.5 × 1.5–2 mm, gland-dotted; filaments exerted 3.5–4 mm long, puberulent towards base. Capsules subobovoid to globose, shortly sitipitate, depressed on top, apiculate, 1 × 1–1.2 cm; stipe 2–3 mm long, dilated at top; seed slightly laterally compressed, aril usually enclosing seed; calyx lobes not persistent in fruit (Fig. 39E).

Coastal Queensland from near Proserpine to Bustard Head; usually in mixed forests on granite.

NORTH KENNEDY DISTRICT: Gregory River near Mt Dryander, *Michael*; Strathdickie North near Proserpine, Aug 1936, *McPherson* 82. SOUTH KENNEDY DISTRICT: Cawley S. F., W of Cathu, between Mackay & Proserpine, Jun 1965, *Webb & Tracey* 7670. PORT CURTIS DISTRICT: Eurumbula, near Bustard Head, Jan 1906, *Keys*.

6. *Lepiderema ixiocarpa* S. T. Reynolds species nova affinis *L. punctulata* (F. Muell.) Radlk. capsulis obovovoidis viscidissimis conspicuis distinguenda. Typus. North Kennedy District: S.F.R. 251, Ismailia, 17 Jun 1954, *Volek* 761 (BRI holotypus).

Shrubs or small trees to 7 m; young parts very viscid; branchlets with linear striations, puberulent. Leaves with 4–6(–9) leaflets on each side of rachis; petioles 2.2–6.5(–8) cm long, terete, pulvinate; rachises 5.5–23.5 cm long, terete, slender, puberulent; pinnae opposite or alternate, ovate to ovate-oblong, abruptly rounded at base and attenuate at apex, tips caudate or acuminate, bases obtuse, rounded, oblique, shortly attenuate and decurrent into petiolules, 3.5–8.5 × 1.5–3.7 cm, glabrous or subglabrous, midribs above usually finely pubescent, semicoriaceous, pellucid punctate, viscid; shiny above and often with short linear crystals; midribs usually forming a slender ridge above, especially towards base, sometimes excentric, lateral nerves 7–9 pairs, obliquely arched and looping at margins, very fine, sometimes indistinct; petiolules slender, 0.6–1.1 cm, terete, pulvinate, puberulent. Inflorescences mostly in upper axils or ramiflorous, 6.5–29 × 1.5–10 cm, laxly branched and flowered; peduncles gland-dotted, viscid, cymules 3–5-flowered. Flowers pinkish red, 5–7 mm diam.; pedicels 2–2.5 mm, articulate towards base, gland-dotted near base, subglabrous; calyx lobes broadly elliptic or broadly ovate, 1.5–3.5 × 1.5–2.5 mm, glabrous, smaller ones gland-dotted; petals elliptic-oblong, 2.5 × 1.5 mm, scurfy towards middle on outside; disc 5-lobed; filaments exerted, 2–3 mm long, pubescent from near middle to base, anthers 1 mm long. Capsules broadly obovoid narrowing into thick short stipe, slightly retuse or truncate at apex and apiculate, carinate at angles towards base (immature ones obcordate, deeply 3-lobed on top with the lobes compressed and wing-like, the persistent style forming a cone-like apiculate tip in centre), 1–1.6 × 1.3–1.6 cm, very viscid with large resin drops scattered over surface; seeds nearly enclosed in aril; stipe 2–3 mm long; calyx lobes reflexed, persistent in fruit (Fig. 39D).

Northern Queensland, around Atherton Tableland; in rainforests as an understorey tree, altitude from 800 to over 1000 m.

COOK DISTRICT: S.F.R. 186, Kauri L.A. (17°00'S 145°30'E), May 1971, *Hyland* 5016; Haig I. A. (17°06'S 145°36'E), Mar 1977, *Gray* 366 (QRS). NORTH KENNEDY DISTRICT: E.P.3, Mt. Haigh, Emerald L.A. 607 (17°50'S 145°37'E), Sep 1973, *Risley* 112 (QRS); S.F.R. 344, Kirrama (18°09'S, 145°35'E), Oct 1969, *Mazlin*.

Very close to *L. punctulata* but the sticky obovoid fruits with persistent calyx and usually more leaflets differentiates this species from it.

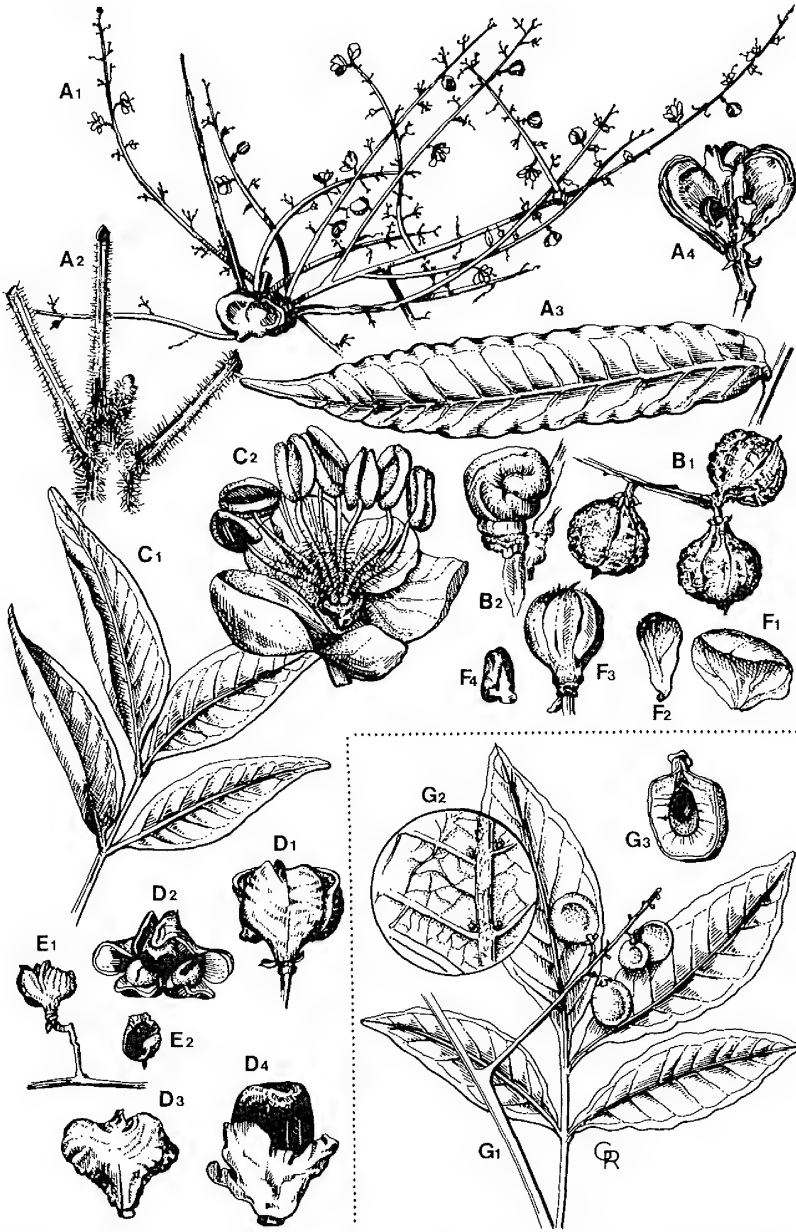


Figure 39. A-F. *Lepiderema* spp. A. *L. hirsuta*, A1 inflorescence ($\times 1$), A2 tip of branchlet ($\times 1$), A3 leaflet ($\times 1$), A4 dehiscent fruit ($\times 1$); B. *L. sericolignis*, B1 fruits ($\times 1$), B2 seed ($\times 6$); C. *L. pulchella*, C1 leaflets ($\times 3/4$), C2 male flower with 3 petals removed ($\times 6$); D. *L. ixiocarpa*, D1 mature fruit ($\times 1$), D2 dehiscent fruit ($\times 1$), D3 young fruit ($\times 1$), D4 seed with aril ($\times 6$); E. *L. punctulata*, E2 seed with aril ($\times 1$); F. *L. largiflorens*, F1 petal ($\times 6$), F2 calyx lobe ($\times 6$), F3 fruit ($\times 1$), F4 seed with aril ($\times 1$). G. *Dimocarpus australianus* G1 fruiting branchlet ($\times 1/2$), G2 part of leaflet in detail ($\times 6$), G3 l.s. of young fruit ($\times 1$).

DIMOCARPUS

Dimocarpus Lour., Fl. Cochinch. 233 (1790). Leenh., Blumea 19:113–131 (1971). **Lectotype species:** *D. lichi* Lour. (syn. *D. longan*).

Euphoria auct. non Commerson ex Juss., Gen. 247 (1789) nom. illeg.; Leenh., l.c.

Pseudonephelium Radlk., Sitzungsber. bayer. Akad. 20:288 (1890); Leenh., l.c. **Type species:** *P. fumatum* (Blume) Radlk. based on *Nepheium fumatum* Blume

Trees or shrubs; indumentum of stellate hairs usually intermingled with scattered long simple hairs. Leaves paripinnate, rarely unifoliolate; leaflets alternate or subopposite, lower surfaces usually papillose, and with naked glands at nerve axils and also near the margins. Inflorescences axillary or terminal paniculate thyrses, sparsely branched with scattered sessile or subsessile cymules; bracteate. Flowers unisexual, usually monoecious; pedicels mostly articulate near base; calyces shortly cupular, 5-sect, lobes ovate, equal, imbricate, slightly concave; petals 5, subobovate to elliptic, scales absent; discs annular, hairy; stamens 6–8, filaments hairy; ovaries sessile, deeply 2-lobed, with solitary ovule in each cell, usually only 1 lobe developing; style simple; stigmas 2-lobed. Fruits usually 1-lobed, this globose or broadly ellipsoid, indehiscent; warty, smooth, or densely long-spiny and granular on outside, smooth and glabrous inside; seeds subglobose, shiny, enveloped by (usually thick) white aril.

Six species, south-eastern Asia, Philippines, New Guinea to Australia; 2 in eastern Australia. One species *D. longan* mainly subsp. *longan* is commonly cultivated as a fruit tree in Asia, New Guinea and in Queensland.

Lower surfaces of leaflets with naked glands in the axil of primary nerves and also near the margins. Ovaries finely stellate pubescent, not warty. Peduncles finely stellate hairy. Branchlets not 5-ribbed. *D. australianus*

Lower surfaces of leaflets rarely with solitary naked glands in the axils of primary nerves, none near the margins. Ovaries densely and coarsely stellate hairy with big tufts of hairs, warty in mature ovaries with each wart crowned by a big tuft of hairs. Peduncles tomentose. Branchlets 5-ribbed *D. leichhardtii*

1. *Dimocarpus australianus* Leenh., Blumea 21:377 (1973). **Type:** Cook District: 6 miles [10 km] S of Helenvale on Shipton's Flat Road, 28 Aug 1970, *Gittins* 2162 (BRI, iso).

Trees often small, buttressed; young parts with fine pale rusty tufted pubescence; others (branchlets, petiole, rachises and petiolules) finely puberulent to glabrous; branchlets with numerous, pale, elliptic lenticels. Leaves with petiole 7.5–21 cm long with 2–3 leaflets each side of rachis; petioles 2.5–6 cm, subterete, pulvinate, mostly lenticellate; rachises 1.5–6 cm, terete, adaxially ridged; pinnae elliptic-ovate, subobovate or oblong-elliptic, tips acute or obtuse or shortly and abruptly acuminate, margins entire, bases acute or obtuse, oblique (with one side truncate and other obtuse), 3–12.5(–15) × 1.5–4(–5.5) cm, glabrous, or lower surfaces puberulent especially towards the base, semicoriaceous, drying paler and somewhat glaucous below; midrib slightly broadly channelled towards base above, raised below, lateral nerves 12–16 pairs, subpatent, usually with naked glands at their axils and near the margins; petiolules 4–8 mm, ± channelled above. Panicles terminal or in

upper axils, 14–27 × 2–16.5 cm, laxly branched; peduncles divaricate, finely stellate hairy, mostly lenticellate, ultimate ones with 3–7-flowered subsessile cymules; bracts ovate-oblong, 1–2 × 0.5–1 mm, pubescent. Flowers 4.5–6 mm diam., cream; pedicels 2–3(–6) mm, pubescent; calyx lobes 2.5–3 × 1.8–2 mm, densely hairy outside, puberulent inside; petals subobovate to elliptic, shortly clawed, 2.5–3 × 1.5 mm, densely hairy towards the middle and papillose at apex inside, puberulent towards the base outside; filaments filiform, 2.5–3 mm long, hairy from about a third down; ovaries ± compressed, pubescent, styles to 2 mm long, pubescent. Immature fruits subobcordate with 2 divaricate, unequal, subglobose lobes, 1.5–2 × 1.5–3.3 cm, or 1-lobed then lobe obliquely obovoid or subglobose to 1.3 × 1.6 cm; finely and minutely pale rusty stellate pubescent outside, glabrous inside; mesocarp fleshy, very spongy and thick (3–5 mm thick including the hard pericarp); seeds with partly developed patelliform white aril at its base. Mature fruits not seen (Fig. 39G).

Northern Queensland usually in mountainous country, quite common in rainforests of McIlwraith Range.

COOK DISTRICT: Alligator Ck catchment on Pascoe River Road (12°35'S, 145°18'E), Oct 1972, *Hyland* 2725 (QRS); Claudie River (12°45'S, 143°15'E), Sep 1976, *Hyland* 3454 (QRS); McIlwraith Ra. on eastern spur about 23 km ENE of Coen, Oct 1962, *Smith* 11847; Rocky River (13°47'S, 143°29'E), Jul 1975, *Hyland* 3227.

2. *Dimocarpus leichhardtii* (Benth.) S. T. Reynolds comb. nov. Based on *Euphoria leichhardtii* Benth., Fl. Aust. 1:468 (1863). **Type:** Eastern Australia, *Leichhardt* (MEL 74654, holo).

Nephelium leichhardtii (Benth.) F. Muell., Append. to Rep. Intercol. Exhib. 25 (1867); *Fragm.* 9:99 (1875). Based on *E. leichhardtii* Benth.

Arytera leichhardtii (Benth.) Radlk., Sapind. Holl.–Ind. 44, 114 (1879), & Sitzungsber. bayer. Akad. 9:510 (1879). Based on *E. leichhardtii* Benth.

Misapplied name: *Euphoria leichhardtii* Benth. var. *hebeptala* auct. non Benth., Radlk., Sapind. Holl.–Ind. 44, 114 (1879).

Branchlets 5-ribbed with pale linear elliptic lenticels crowded in the grooves; coarsely or tuberculate pubescent with dense large stellate or tufted hairs. Leaf with petiole to 10 cm long; petiole 2 cm long, semiterete, broad at base, puberulent; rachis 3.2 cm long, adaxially ridged, pubescent; pinnae 7, elliptic or subobovate, broader above the middle with broad obtuse apices, margins entire, bases unequal (usually obtuse on one side, acute on the other), 5.5–6.5 × 2.8 cm, glabrous or subglabrous above, puberulent below, semicoriaceous, drying darker and shiny above, pale below, lateral nerves 10 pairs, arched at their tips, usually without naked glands at their axils; petiolules 3–5 mm long, pubescent. Panicles erect, slender, with short branches and interrupted clusters of subsessile cymules, 8–10.5 × 0.5–6 cm, peduncles broad at base, tomentose, cymules 3–7-flowered. Flowers 5.5–6(–7) mm diam; pedicels 1–1.5 mm, pubescent; calyx lobes ovate, obtuse, 2.5–3 × 1.7–2 mm, tomentose outside, pubescent inside; petals 3 × 1.5 mm, elliptic or subobovate, shortly clawed with scattered white curly hairs on the inside towards middle and margins, glabrous at apex; glabrous or rarely subglabrous towards base outside; filaments 3.5–4.5 mm in males, (1 mm long in females) puberulent from above middle to base; anthers 1.25 × 0.25 mm; ovaries deeply 2-lobed, lobes globose, densely, coarsely or tuberculate stellate hairy with large tufts of hairs, mature lobes warty with each wart topped by a big hairy tuft; styles 1.5–3 mm long, pubescent. Fruits not seen.

Known only from the type. Very close to *D. australianus* differing mainly in being more hairy with coarser hairs, warty ovary, and the leaves rarely with naked glands in the axil of main nerves. It is close to and may be a variant of *D. longan* subsp. *longan*, differing from overseas material in having narrower and shortly branched panicles. More collections of *D. leichhardtii* are necessary before any conclusion can be made.

There is some doubt as to the locality of the type as Dr. Leichhardt was not known to collect from tropical eastern Australia, especially in the type of habitat that *Dimocarpus* grows in, unless the type was collected from a cultivated specimen, but again there is doubt that *D. longan* could have been introduced so early in Australia. Perhaps Bentham was right in treating *Euphoria leichhardtii* as an Australian endemic distinct from others.

When Bentham described *Euphoria leichhardtii* Benth., l.c. 1863, he also distinguished a variety *hebeptala* and cited Leichhardt's specimen from Nurrum Nurrum [Neurum, 60 km NNW of Brisbane] but the holo- and isotypes (MEL 74655 & 75656) of *E. leichhardtii* var. *hebeptala* were found to be *Arytera foveolata* F. Muell. which occurs in the area, ranging from Richmond River, New South Wales, to Gympie. Bentham's description of the species and variety fit the specimens of each that he cited.

Radlkofer (1879) combined *E. leichhardtii* and its variety *hebeptala* under *Arytera leichhardtii* (Benth.) Radlk. He probably did not see the type specimens held at Melbourne. The types he saw were probably duplicates of the "Nurrum Nurrum" specimen because his description of *A. leichhardtii* fits *A. foveolata*. Because he wrongly treated *E. leichhardtii* var. *leichhardtii* and var. *hebeptala* as being conspecific, Radlkofer's use of the name *E. leichhardtii* var. *hebeptala* must be considered a misapplication of the name, and *Arytera leichhardtii* (Benth.) Radlk. p.p. is placed in synonymy under the earlier *A. foveolata* F. Muell.